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# Teacher Preparation Pathways: Differences in Program Selection and Teacher Retention

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## ABSTRACT

A comparison of population and employment projections shows the gap between teacher supply and demand growing through 2025. Alternative certification programs (ACPs) were created to increase teacher production, but research on who selects ACPs versus traditional preparation programs (TPPs) shows mixed results as does research on new teacher attrition. Analyzing employment and preparation data for over 225,000 new teachers (56% ACP), we found male and teachers of color were more likely to be ACP prepared. Using survival analysis, we found TPP teachers were significantly more likely to remain in the classroom than ACP teachers. We also found that teachers of color were more likely to stay teaching after accounting for preparation differences, and Latinx teachers from traditional preparation programs were most likely to stay teaching.

## ARTICLE HISTORY

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## KEYWORDS

Teacher demographics; survival analysis; teacher attrition; traditional teacher preparation; alternative teacher preparation; Longitudinal study

## Introduction

The demand for teachers in the United States is greater than the supply of new teachers (U.S. Department of Education, 2016). The supply-versus-demand gap is expected to increase over the next decade because (a) the number of students enrolled in USA schools is projected to increase substantially (Hussar & Bailey, 2017; cf. Bureau of Labor Statistics, 2018), and (b) the number of highly experienced teachers permanently leaving the classroom due to retirement or promotion to administrative positions within the school district has dramatically increased in recent decades (Goldring, Taie, Riddles, & Owens, 2014). To reduce this teacher supply-demand gap, states with large projected increases in student population and/or with large populations of teachers close to retirement will need to increase teacher production. To increase production, states will need to reduce harmful barriers to entry into teacher preparation programs (Van Overschelde & Burgard, 2019; Van Overschelde & López, 2019). Simultaneous to reducing these barriers, states will need to ensure these new teachers are effectively prepared to teach.

This study examines the impacts of experiments being conducted by states to increase the number of teachers prepared through alternative certification programs (ACP) to determine whether differences exist in the demographic characteristics of the teachers who are prepared by ACPs versus traditional preparation programs (TPP). ACPs consist of for-profit companies and non-profit organizations that prepare many post-baccalaureate teacher candidates, whereas TPPs prepare undergraduate teacher candidates. We found substantial differences in who is prepared by alternative versus traditional programs, with teachers of color most likely to be alternatively prepared. Controlling for these demographic differences, we examined differences in new teacher persistence over a decade and found ACP teachers are most likely to leave the classroom. Accounting for differences in preparation program, teachers of color are significantly more likely to remain teaching

than White teachers, and Latinx teachers who are traditionally prepared are most likely to remain teaching over the first 10 years in the classroom.

## Conceptual Framework

Preparing, recruiting, and retaining highly qualified and diverse teachers has become increasingly important to states and school districts (e.g., U.S. Every Student Succeeds Act). As a result, an examination of teacher supply and demand, as influenced by determinants of teacher attrition and retention, is warranted so that policies and practices can be developed to directly address and improve these issues. We define teacher supply as the number of teachers who are formally prepared and certified to enter the teaching workforce. Teacher supply has two components: new teachers and teachers who left the classroom temporarily and are available to move back to the classroom. We define teacher demand as the number of teaching positions that need to be filled with qualified teachers. Teacher demand at the state or nation levels fluctuates in response to (1) loss of existing teachers through permanent (e.g., retirement, promotion) or temporary (e.g., raise a child, attend graduate school) teacher attrition, and (2) changes in student enrollment. Determinants of teacher attrition and retention include individual attributes, like race/ethnicity, gender and age and teacher education and preparation (Rubenstein et al., 2017; Ingersoll, Merrill, & May, 2014).

The research is clear on new teacher attrition. On average, ACP teachers leave teaching at higher rates than TPP teachers (Boyd et al., 2012). Research shows conflicting results, however, for new teacher attrition rates as a function of teacher individual attributes. Some research showed White and female teachers were significantly more likely to leave teaching than were teachers of color and male teachers, respectively (Borman & Dowling, 2008), and other research showed higher percentages of White teachers remained in the classroom compared to their peers of color and no differences in teacher attrition by gender (Raue, Gray, & O'Rear, 2015).

It is unclear what accounts for these different attrition results. Logically, it is possible that teacher attrition is associated with (a) changes in teacher labor markets that negatively impact teachers of color and male teachers more than White and female teachers, (b) systematic differences in teacher preparation program selection across teacher candidates' demographic characteristics (e.g., gender, ethnicity), and/or (c) systematic differences in the types of schools that groups of teachers (e.g., ACP versus TPP) might teach. There is some evidence for systematic differences in teacher preparation selection. For example, a review of national data and data from seven U.S. regions where ACP and TPP programs existed found no gender differences in who completes ACPs versus TPPs, but there were differences between White teachers and teachers of color in particular regions or from particular ACPs (Humphrey, Wechsler, & Hough, 2008). In contrast, several other studies found gender, ethnicity, and age differences between teachers prepared through ACPs and TPPs (Achinstein, Ogawa, Sexton, & Freitas, 2010; Redding & Smith, 2016; Zumwalt & Craig, 2009).

Over the next decade, projections indicated the U.S. will experience an overall teacher shortage, where teacher demand is far greater than teacher supply. Moreover, the pipeline feeding the teacher supply will contain a dwindling pool of teachers of color (Carver-Thomas, 2018). If the demographics of people who select an ACP versus a TPP are different, then the differences in attrition between ACP and TPP teachers could be explained, at least partially, by these demographic differences. To understand this phenomenon, we must better understand functions of teacher attrition, including where demographically diverse teachers are likely to be trained and certified and the likelihood they will remain in the classroom over time. To develop policies designed to effectively address the recruitment and retention of qualified teachers, especially qualified teachers of color, understanding pathways to teaching and who chooses ACPs or TPPs is critical. The research on teacher preparation program selection, new teacher attrition and individual attributes of who selected ACPs versus TPPs forms the basis for examining whether the confluence of these factors influence teachers' likelihood to remain in the classroom.

## Literature Review

### ***New Teacher Demand Projections***

The demand for teachers is projected to grow over the next decade because of large increases in the number of students enrolled in public schools. Recent projections show the number of public-school teachers needed in US schools is expected to increase by about 270,000 teachers (7% growth rate) between 2013 and 2025 (Hussar & Bailey, 2017; cf. Bureau of Labor Statistics, 2018). This estimate reflects an average annual increase of about 23,000 teachers.

The demand for new teachers is also projected to grow over the next decade because the percentage of teachers leaving the classroom permanently has increased dramatically. For example, public schools lost an estimated 260,000 teachers in 2012–13 (8% of the teaching workforce; Goldring et al., 2014). The vast majority (71%) of these teachers left the classroom permanently due to retirement (38%) or through promotion to administration or other education-related position (33%). This permanent teacher loss rate contrasts with the rate in 1987–1988 that totaled only 42% of the teaching workforce – a 29 percentage point increase (Bobbitt, Leich, Whitener, & Lynch, 1994).

In 2012–2013, a small minority of teachers (11%) left the classroom for reasons that might be considered temporary, including caring for family members (9%; e.g., to raise a baby) or enrolling in higher education (2%). This temporary loss represents a 22-percentage point decrease since 1987–88 when this temporary loss totaled 33%. The dramatic shift in the percentages of teachers leaving for temporary versus permanent reasons is likely to impact school districts' ability to rehire qualified teachers from the “reserve pool” (Murnane, Singer, & Willet, 1988) to fill necessary teaching positions.

Combining these two sources of demand for teachers, school districts must hire approximately 287,000 new teachers annually; 27,000 teachers for increases in student enrollment and 260,000 teachers to annually replace existing teachers who left the classroom. Unfortunately, the U.S. only produced 172,000 new teachers in 2014–2015 (U.S. Department of Education, 2016). This new-teacher preparation rate is 83,000 fewer (33%) than the 255,000 new teachers prepared in 2003–2004<sup>1</sup>. The decrease in the supply of new teachers and the increase in the demand for new teachers reflects an annual teacher shortage of 115,000 teachers (287,000 needed - 172,000 produced), assuming all newly prepared teachers enter the classroom. This shortage must be made up either by hiring (a) teachers in the reserve pool (e.g., left the classroom temporarily, previously certified but never taught) or (b) hiring unqualified people to teach.

### ***Teacher Preparation Programs and Teacher Production***

To address teacher production shortages and to meet school district demands for new teachers, states have created alternative pathways through which people can become teachers beyond the “traditional,” university-based TPPs (Humphrey et al., 2008; U.S. Department of Education, 2002; Van Overschelde, Saunders, & Ash, 2017; Woods, 2016). In 2014–2015, nationally 83% of new teachers were prepared through undergraduate (UG), university-based TPPs, whereas only 10% were prepared by non-university based ACPs (U.S. Department of Education, 2018). Texas has been experimenting with ACPs since at least 1995 when the Texas Legislature codified its desire for an “additional source of qualified educators” (Texas Education Code, §21.049). In 2015, Texas ACPs prepared 52% of all non-university ACP teachers prepared *in the USA*. New Jersey was a -distant second, preparing 9% of all ACP teachers (U.S. Department of Education, 2018).

Allowing ACPs to prepare new teachers is one way of increasing the number of future teachers prepared. Unfortunately, new teacher production is simultaneously being hampered by federal, state, and national policies. For example, many states and the national teacher preparation accrediting body are pushing to increase the GPA criterion for admissions into TPPs and ACPs under the

presumption that doing so would increase the quality of new teachers. Although this idea is intuitively appealing, the data do not support it. Van Overschelde and López (2019) found that increasing the GPA admission criterion for sophomore students seeking to become teachers through TPPs from 2.50 to 2.75 had no impact on the short-term TPP outcomes and minimal impacts on the long-term outcomes seen by employers. The higher GPA criterion had a negative impact on teacher production by dramatically reducing the number of potential future teachers. The bulk of the loss of future teachers came at the expense of male and Black teachers.

New teacher production by TPPs is also hampered by their inherent design; this design often occurs in response to state laws (Van Overschelde & Burgard, 2019). TPPs frequently culminate with a full-time (40+ hours per week), semester- or year-long student teaching experience that is financially burdensome for low-income students because they are unable to work a paid job at the same time (Van Overschelde & Burgard, 2019). In some cases, students also experience a reduction in their Pell grants, thereby increasing the financial burden of becoming a teacher. Van Overschelde and Burgard (2019) showed that Pell-eligible UG teacher candidates – the majority of whom were candidates of color – are most likely to drop out of a TPP before student teaching, presumably because of the financial burden. This loss of candidates of color who are Pell-eligible creates a situation where the future teaching force being prepared by TPPs becomes Whiter because they are the wealthiest students, on average.

The student teaching design at TPPs contrasts markedly with ACPs that can offer paid internships to students. ACP students are paid by the schools because they are the official teachers of record. State laws require teachers of record to hold a bachelor's degree, thereby eliminating 83% of teacher candidates from the internship option.

Given the evidence from Van Overschelde and Burgard (2019) that wealthier teacher candidates, who are more likely to be White, are more likely to complete a TPP than lower-income candidates, who are more likely to be Black or Latinx, one might expect that candidates of color would be more likely to enroll in ACPs where they can be the paid teacher of record. However, the data in this regard are not consistent. For example, Humphrey et al. (2008) reviewed data from seven U.S. regions and found no gender differences in who completed an ACP versus a TPP. But they did find a few differences between White teachers and teachers of color in certain labor markets. Redding and Smith (2016) used national, School and Staffing Survey (SASS) data collected between 1999–2000 and 2011–2012 from approximately 18,000 teachers with less than 5 years of teaching experience. They found no gender or ethnicity differences between who were prepared by ACPs versus TPPs in 1999–2000, but by 2011–12, females were prepared by TPPs at a higher rate than by ACPs. The shift appears to have been caused by greater female enrollment in TPPs from 1999–2000 to 2011–12 and not by changes in the gender diversity at ACPs. They also observed a similar shift across time for students of color. In 1999–2000, students of color were equally likely to be prepared by ACPs and TPPs. By 2011–2012, TPP preparation of students of color had decreased five percentage points and ACP preparation had increased one percentage point resulting in a significant difference. Unfortunately, Redding and Smith (2016) treated students of color as a uniform group therefore making it impossible to determine differences across racial/ethnic groups.

### ***New Teacher Attrition***

To understand teacher employment patterns and the potential for teacher shortages, research has estimated the loss of new teachers within the first 5 years of teaching. The attrition rates have varied from 17% in 2015 (Gray, Taie, & O'Rear, 2015) to 46% in the late 1990s (Ingersoll, 2003). As noted above, the temporary versus permanent nature of the attrition has shifted dramatically over the last couple of decades and now indicates that 29% of the teachers who leave the classroom each year might come back in the future, down from 58%.

To compound the attrition issue, it is a well-established finding that new teachers prepared through TPPs remain in the classroom at significantly higher rates than teachers prepared through ACPs (Boyd

et al., 2012; Redding & Smith, 2016; Van Overschelde et al., 2017). Boyd et al. (2012) longitudinally tracked teachers who were prepared traditionally or through the two largest ACPs serving New York City (New York City Teacher Fellows, Teach for America). After 5 years, 69% of the TPP teachers were still teaching in New York City schools, whereas only 51% of the Teacher Fellows and 14% of the Teach for America completers were still teaching. Van Overschelde et al. (2017) reported that a significantly higher percentage of new middle-school teachers from one large TPP (79%) was still teaching in Texas public schools after 5 years compared to 62% of new ACP middle-school teachers.

### **Teacher Characteristics**

As we noted above, evidence about the demographic characteristics of people who select TPPs versus ACPs is inconsistent. Interestingly, the attrition research as a function of teacher demographics is similarly inconsistent. In an older meta-analysis of 34 teacher attrition studies, Borman and Dowling (2008) found White teachers were 1.36 times more likely to leave teaching than teachers of color. By contrast, a recent study (Raue et al., 2015) involving national survey data from 1,440 new teachers showed a higher percentage of White teachers still teaching after 5 years compared to teachers of color (78% vs. 74%, respectively). Redding and Smith (2016) found no differences in teacher attrition between White teachers and teachers of color using a sample of 18,080 new teachers of which the vast majority were TPP teachers. Methodological differences among these three studies make drawing conclusions somewhat difficult. For example, Redding and Smith (2016) collectively examined all teachers with five or fewer years of experience and Raue et al. (2015) examined employment only at the five-year mark. Aggregating teachers by experience makes it impossible to accurately track teacher attrition by years of experience or across time. Both studies (Raue et al., 2015; Redding & Smith, 2016) also treated all teachers of color collectively as a uniform group so that determining differences in attrition among Black, Latinx, and other teacher ethnicities was not possible.

The attrition research as a function of teacher gender is similarly inconsistent. Borman and Dowling (2008) found female teachers were 1.30 times more likely to leave the classroom than males, but Raue et al. (2015) and Redding and Smith (2016) both found similar percentages of new male and female teachers still teaching after 5 years. It is unclear what accounts for these different attrition results and none of these attrition-demographic studies compared attrition between TPP and ACP after controlling for demographic differences. Given these inconsistent findings, further exploration of these issues is needed.

### **Research Questions**

The purpose of this study is to fill the substantial gap in the teacher preparation and teacher attrition literatures by examining differences in the demographic characteristics of teachers who select to be prepared through university TPPs versus ACP and to directly examine the attrition of new teachers after controlling for demographic differences using a large, statewide, and demographically diverse sample of new teachers. To examine these issues in detail, our research questions are:

- (1) Do the demographic characteristics of new teachers vary between those prepared through traditional versus alternative preparation programs?
- (2) Which demographic characteristics of new teachers (i.e., race/ethnicity, gender, age, certification route) were associated with the lowest risk of leaving the classroom?

## **Method**

### **Participants and Programs**

Texas is an ideal state for research on teacher preparation pathways because the majority of new teachers prepared in Texas are prepared through non-profit and for-profit ACPs. Texas is also the

largest state preparer of non-university ACP teachers, preparing over 50% of all ACP teachers in the USA. ACPs and TPPs differ in numerous ways. For example, TPPs are restricted by state law in the type of curriculum they are permitted to offer whereas ACPs are not. Also, TPP candidates complete unpaid student teaching where they take incremental responsibility for teaching under the tutelage of a district-employed certified teacher and a university-employed faculty supervisor, whereas ACP candidates complete a paid internship as the teacher of record under the guidance of an ACP supervisor.

To create our sample, we selected all public and charter school teachers (special duty teachers, teachers, and substitute teachers who were the official teacher of record) employed in Texas between 2006–2007 and 2017–2018. We specifically excluded teachers who were classified as “unassigned professional classroom duty” because these people were not the official teachers of record despite their *teacher* status. From the 605,686 unique teachers, we removed teachers who were missing demographic information. This resulted in 554,909 teachers. By comparing year-to-year values for the state’s *Experience* variable for each teacher, we determined that this variable was incorrect for 6–12% of the teachers employed each school year with many teachers classified as new who were not new. We, therefore, derived a *new-teacher* status variable based on when they earned their first standard, non-probationary, teaching certificate and incremented a new *Experience* counter for each year the teacher worked at least 80% of a full-time equivalency, consistent with state law. By this definition, 262,373 teachers in the sample were classified as *new*. Teachers who were classified as new in Texas but who had transferred a teaching certificate from out of state were excluded (23,278) because it was not possible to accurately determine when they were first certified to teach in the other state. University-prepared, post-baccalaureate students (13,193) were excluded because they represented a small and shrinking percentage of the new teachers prepared in Texas, and because there were very small number of teachers of color in this group. In addition, most teacher preparation policies efforts in Texas are focused on ACP and TPP teachers.

Our final sample of new teachers included those who were recommended for certification by an undergraduate TPP or by a post-baccalaureate ACP and who began teaching in Texas during our employment period between 2006–2007 and 2016–2017. The demographic characteristics of this sample are shown in Table 1.

Of the 225,902 new teachers in our sample, 125,562 (56%) were ACP prepared and 100,340 (44%) were TPP prepared. Although ACP teachers made up 56% of the sample, 78% of new Black teachers and 63% of Other-ethnicity teachers were prepared through ACPs, whereas 51% of White teachers and 54% of Latinx teachers were similarly prepared. Male teachers prepared through ACPs made up 71% of new male teachers, and 51% of new female teachers were ACP prepared. The average age of ACP teachers was 26.6 years and of TPP teachers was 23.7 years.

**Table 1.** Comparison of demographic characteristics of teachers by teacher preparation pathway.

	Traditional		Alternative	
	n	Group %	n	Group %
Sample	100,340	44%	125,562	56%
Ethnicity				
Black	5,652	22%	19,482	78%
Hispanic	29,197	46%	34,897	54%
Other	3,159	37%	5,309	63%
White	62,332	49%	65,874	51%
Gender				
Female	84,187	49%	86,327	51%
Male	16,153	29%	39,235	71%
	<b>Mean</b>	<b>Std dev</b>	<b>Mean</b>	<b>Std dev</b>
Age (std dev)	23.7	9.5	26.6	9.3

The % column reflects the percentage of all teachers in a row who were traditionally versus alternatively prepared (e.g., 22% of all Black teachers were traditionally prepared).

## Data Source and Data Collection

The data for this study were obtained from the Texas Education Research Center (ERC), which houses the state's *P*-20 education and workforce data warehouse. The ERC holds 27+ years of de-identified, longitudinally linkable educational and workforce data from the Texas Education Agency (TEA), which provides extensive data on public *P*-12 education; the Texas Higher Education Coordinating Board (THECB), which provides extensive data on public and private higher education; and the Texas Workforce Commission, which provides unemployment insurance wage data for every legally employed person in the state. The ERC data are collected as part of the state's normal administrative and oversight responsibilities. School districts and higher education institutions are statutorily required to provide these data to TEA and THECB, respectively. We received permission from the state's ERC Advisory Board to access a subset of these data.

Teacher ethnicity, gender, and employment status were obtained from TEA employment datasets. Because date of birth is not housed in the ERC, teacher age was obtained from an age file prepared by TEA that included each *P*-12 employee's age as of September 1 of each school year. Teacher certification information was obtained from the State Board for Educator Certification's certification dataset (provided by TEA), which contains every educator certification issued since the 1950s.

## Data Analysis

To answer our first research question, we computed a logistic regression model with preparation route (Traditional = 1) as the dichotomous dependent variable (DV) and gender (Female = 1), Black, Hispanic, and Other ethnicity as dummy-coded (Yes = 1) independent variables (IV); and age as of September 1 of the year the teacher first taught as a covariate. White was the reference ethnicity.

To answer our second research question, we used a Cox regression model to investigate when teachers left the classroom for the first time. The IVs in the Cox regression included EPP (Traditional = 1, ACP = 0), gender (Female = 1), Black, Hispanic, Other ethnicity, and age as of September 1 of the year the teacher first taught, and interaction variables for EPP\*Gender, EPP\*Black, EPP\*Hispanic, and EPP\*Other. White was the reference ethnicity.

Our statistical model is based on Singer and Willet's (2003) framework for conducting event history analysis. Because we are interested in determining whether different types of teachers have different hazard functions, we included predictors in our model,  $Z_p$  ( $p = 1, 2, \dots, P$ ), which characterized the members of the group. We denoted individual teacher  $i$ 's values for each  $p$  predictor in a time period  $j$  as the vector  $z_{pij}$  (Formula 1). We assumed values of the predictors are time invariant. The equation represents the probability that individual teacher  $i$ , as distinguished by his or her predictor values,  $z_{1ij}, z_{2ij}, \dots, z_{pij}$ , left the classroom in period  $j$ , given that he or she had remained in teaching through all prior time periods,

$$h(ij) = P[T = j|T > j, Z_{pij} = z_{pij}]. \quad (1)$$

In this model, the hazard probabilities can be re-parameterized to have a logistic dependence on the time periods and predictors (Cox, 1972, as cited in Singer & Willet, 2003). This conceptualization captures the two essential functions of the discrete-time hazard model: (1) a baseline profile of risk/baseline hazard function, represented as  $[\alpha_1 \alpha_2 \dots \alpha_j]$ ; and (2) a parameter that captures any shift in the risk that is associated with the predictors, represented as  $[\beta_1 \beta_2 \dots \beta_p]$ . The population discrete-time hazard model was

$$h(ij) = \frac{1}{1 + e^{-[(\alpha_1 D_{1ij} + \alpha_2 D_{2ij} + \dots + \alpha_j D_{jij}) + (\beta_1 Z_{1ij} + \beta_2 Z_{2ij} + \dots + \beta_p Z_{pij})]}}. \quad (2)$$



$[D_{1ij} D_{2ij}, \dots, D_{Jij}]$  were a sequence of dummy variables, with values  $[d_{1ij} d_{2ij}, \dots, d_{Jij}]$  indexing time periods.  $J$  referred to the last time period observed for any teacher in the sample.

$$\log_e \left( \frac{h_{ij}}{1 - h_{ij}} \right) = (\alpha_1 D_{1ij} + \alpha_2 D_{2ij} + \dots + \alpha_J D_{Jij}) + (\beta_1 Z_{1ij} + \beta_2 Z_{2ij} + \dots + \beta_p Z_{Pij}). \quad (3)$$

Equation 3 represents the conditional log-odds of event occurrence (i.e., leaving the classroom) in each time period, given that it did not occur before, and it is a linear function of the baseline level of hazard ( $\alpha_j$  parameters), specific to time period  $j$ , and slope parameters describing the effects of the predictors on the baseline hazard function.

## Results

The logistic regression results for our first research question (see Table 2) showed significant and substantial differences in the types of teachers who were prepared through TPPs versus ACPs. The results showed that the odds of a female teacher being TPP prepared was 2.3 times greater than for male teachers ( $Z = 75.22, p < .001$ ); males were statistically more likely to be alternatively prepared. After accounting for gender and age differences, Black teachers were 3.2 times more likely ( $Z = -69.21, p < .001$ ), Latinx teachers were 1.1 times more likely ( $Z = -12.59, p < .001$ ), and Other ethnicity teachers were 1.6 times more likely ( $Z = -18.99, p < .001$ ) than White teachers to be ACP prepared. Finally, as age increased by 1 year the odds of being ACP prepared increased by 1.03 times ( $Z = -63.14, p < .001$ ); this result presumably reflects the basic fact that TPP teachers were UG students and ACP teachers were post-baccalaureate.

The Cox regression used to answer our second research question (see Table 3) indicated significant variations in the demographic characteristics of who left teaching over time. The results showed that TPP teachers were 66% less likely to leave teaching compared to ACP teachers (see Figure 1;  $z = -35.18, p < .001$ ) after accounting for the substantial demographic differences. Adjusting for the other variables in the Cox regression model, after 5 years, 78% of TPP teachers and 47% of ACP teachers were predicted to still be teaching, and after 10 years, 63% of TPP teachers and 28% of ACP teachers were predicted to have left the classroom.

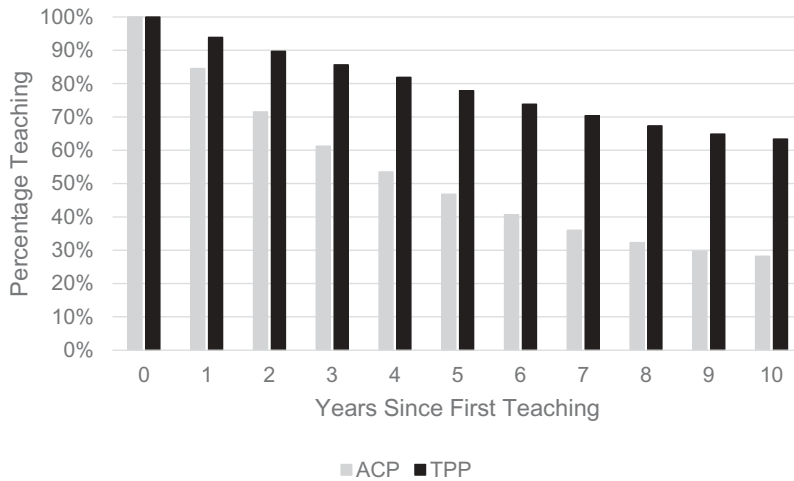
**Table 2.** Logistic regression results for EPP enrollment.

	Coefficient	Std Error	$z$	$p$
Gender (1 = Female)	0.82	0.011	75.22	0.000
Black (1 = Yes)	-1.16	0.017	-69.21	0.000
Hispanic (1 = Yes)	-0.13	0.010	-12.59	0.000
Other (1 = Yes)	-0.46	0.024	-18.99	0.000
Age	-0.03	0.001	-63.14	0.000
Constant	0.37	0.019	19.34	0.000

Outcome of 1 = TPP and 0 = ACP.

**Table 3.** Cox regression results for new teacher persistence.

	Hazard Ratio	Std Error	$Z$	$p$
Preparation (1 = TPP)	0.34	0.010	-35.18	0.000
Gender (1 = Female)	0.98	0.010	-2.04	0.041
Black (1 = Yes)	0.93	0.012	-5.15	0.000
Hispanic (1 = Yes)	0.76	0.008	-25.32	0.000
Other (1 = Yes)	1.23	0.026	9.66	0.000
Age	0.99	0.001	-17.59	0.000
Preparation*Gender	1.02	0.019	0.93	0.352
Preparation*Black	0.99	0.028	-0.23	0.817
Preparation*Hispanic	0.85	0.015	-9.13	0.000
Preparation*Other	0.93	0.035	-2.04	0.041
Preparation*Age	1.03	0.001	31.90	0.000

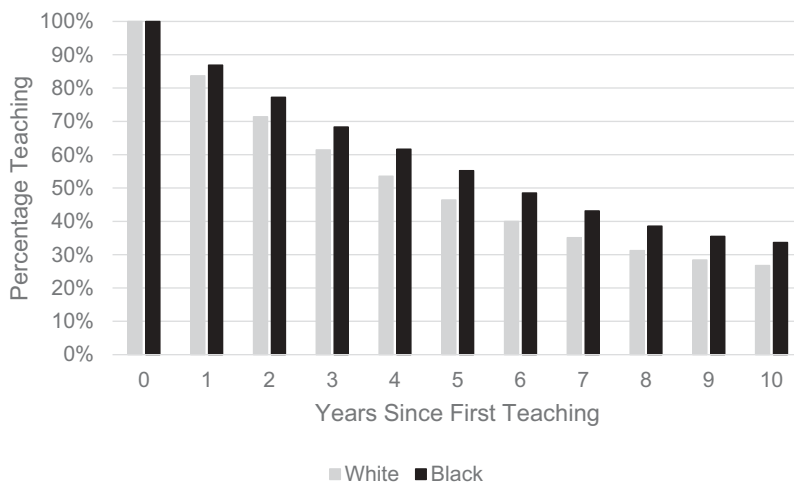


**Figure 1.** Percentage of teachers predicted to be teaching over 10 years since first starting to teach, by preparation pathway.

Relative to female teachers and accounting for differences in preparation pathways and other demographic characteristics, male teachers were 2% less likely to leave the classroom ( $z = -2.04$ ,  $p = .04$ ).

Relative to White teachers and accounting for differences in preparation pathways and other demographic characteristics, Black teachers were 7% less likely to leave the classroom ( $z = -5.15$ ,  $p < .001$ ; See Figure 2), Latinx teachers were 24% less likely to leave the classroom ( $z = -25.32$ ,  $p < .001$ ; See Figure 3), and *Other* ethnicity teachers were 23% more likely to leave the classroom ( $z = 9.66$ ,  $p < .001$ ; See Figure 4). Older teachers were more likely to remain teaching ( $z = -17.59$ ,  $p < .001$ ) than younger teachers; a 10-year older teacher was 10% more likely to remain teaching than her younger peer.

The interaction of EPP and Latinx was also significant, with TPP Latinx teachers 15% less likely to leave teaching than their peers ( $z = -9.13$ ,  $p < .001$ ). As can be seen in Figure 5, the difference in predicted attrition rates after 5 years between ACP and TPP teachers was smaller for Latinx teachers (6 percentage points) than for White teachers (11 percentage points). In other words, White ACP teachers were 11 percentage points less likely to be teaching than White TPP teachers, whereas



**Figure 2.** Percentage of Black versus White teachers predicted to be teaching over 10 years since first starting to teach.

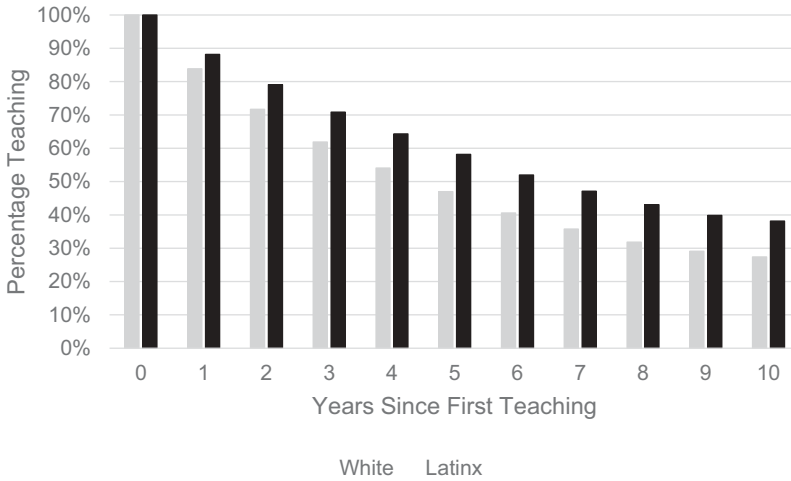


Figure 3. Percentage of Latinx versus White teachers predicted to be teaching over 10 years since first starting to teach.

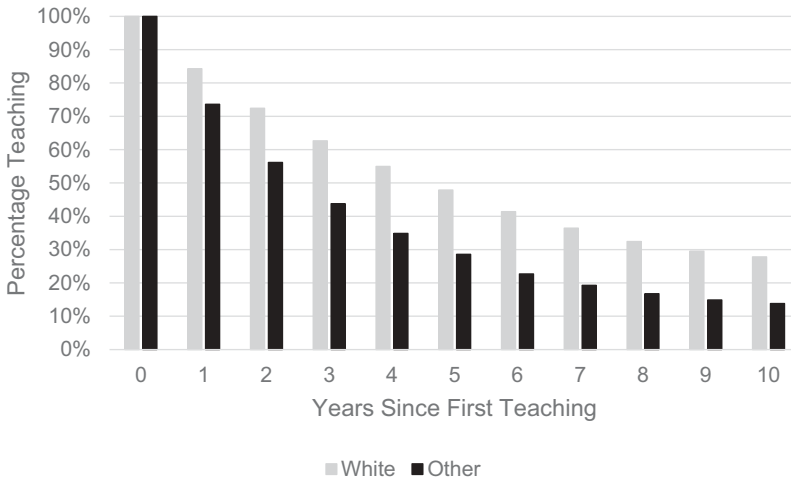
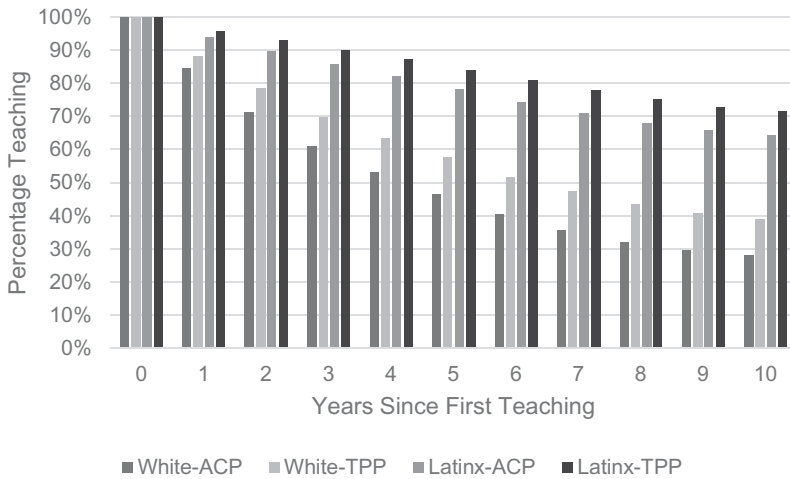


Figure 4. Percentage of Other ethnicity versus White teachers predicted to be teaching over 10 years since first starting to teach.

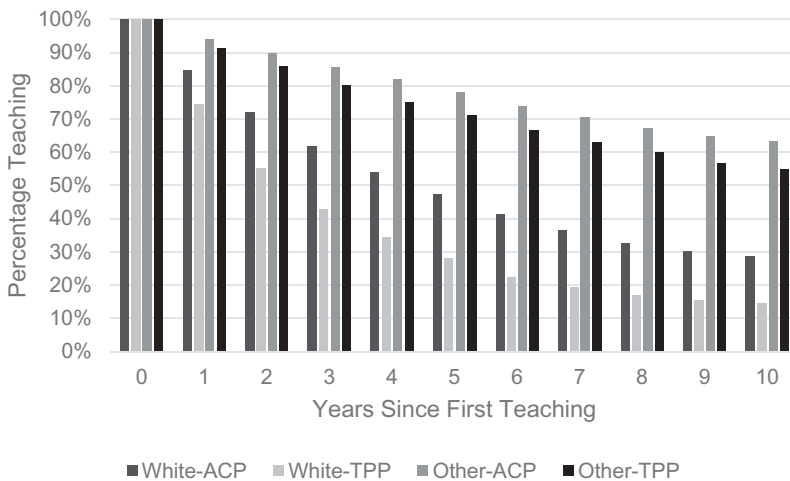
Latinx ACP teachers were only 6 percentage points less likely to be teaching than Latinx TPP teachers, all else being equal.

The interaction of EPP and Other-ethnicity was also significant, with TPP Other teachers 7% less likely to leave teaching than their peers ( $z = -2.04, p = .04$ ). As can be seen in Figure 6, the difference in predicted attrition rates after 5 years between ACP and TPP teachers was smaller for Other teachers (7 percentage points) than for White teachers (19 percentage points). In other words, White ACP teachers were 19 percentage points less likely to be teaching than White TPP teachers, whereas Other ACP teachers were only 7 percentage points less likely to be teaching than Other TPP teachers, all else being equal.

The interaction of EPP and age was also significant ( $z = 31.90, p < .001$ ) indicating that TPP teachers were 3% more likely to leave teaching for each year increase in age, relative to their ACP peers of the same starting age.



**Figure 5.** Percentage of Latinx and White teachers predicted to be teaching over 10 years since first starting to teach, by preparation pathway.



**Figure 6.** Percentage of Other-ethnicity and White teachers predicted to be teaching over 10 years since first starting to teach, by preparation pathway.

## Discussion

Several national projections on the need for new teachers reveal a substantial gap between the number of new teachers currently being prepared in the USA and the number of new teachers that will be needed by school districts through 2025 (Bureau of Labor Statistics, 2018; Goldring et al., 2014; Hussar & Bailey, 2017). Over the last several decades, states have moved to increase the alternative pathways into teaching by increasing the number of alternative certification programs (ACPs). However, the existing research on who is prepared through ACP versus university teacher preparation program (TPP) reveals inconsistent findings. Similarly, the research on the demographic characteristics of new teachers who leave teaching during the first 5 years is also inconsistent and most of the studies used small samples of survey data.

To fill these gaps in the extant literature, our research was designed to inform these issues. We used a statewide population of about 225,000 ethnically diverse new teachers, a majority of whom

were ACP prepared, and we tracked their employment history for up to 10 years. The data for our study included actual public education employment data and educator certification data instead of survey responses. Our research results in a number of important new findings and several findings that clarify the boundary conditions for similar prior findings.

### **Teacher Production**

Our first important finding is that early-career Black, Latinx, and Other-ethnicity teachers were more likely than White teachers to be prepared by ACPs than TPPs. Specifically, we found that new Black teachers were 3.2 times more likely to be ACP prepared, compared to White teachers, but Latinx teachers were only 1.1 times more likely and Other-ethnicity teachers were 1.6 times more likely. These results are somewhat similar to Redding and Smith (2016) who used SASS data and reported that teachers of color and White teachers were equally likely to be ACP and TPP prepared in 1999–2000 and teachers of color were more likely to be ACP prepared in 2011–2012. Unfortunately, they lumped all teachers of color into a single group. Our results add to the extant literature because we show substantial differences in ACP preparation rates among the three non-White racial/ethnic groups.

The over-representation of Black, Latinx, and Other-ethnicity teachers at ACPs raises many interesting questions about why this pattern exists. Why are Black teachers much more likely to be ACP prepared than Latinx or White teachers? One possible explanation may be related to the relationship between race/ethnicity and income levels. Teachers of color are more likely to be recipients of Pell grants (Ifill & Hufford, 2015) and thus may be less likely to afford to complete the student teaching clinical experience required in a TPP. Van Overschelde and Burgard (2019) found that Pell-eligible students are least likely to complete an UG TPP. Attending an ACP does not include the same financial burden because a teacher candidate attending an ACP is hired and paid as the teacher of record during their clinical teaching experience, thereby substantially reducing the financial burden of becoming a teacher.

Our second key finding is that male teachers were 2.3 times more likely to be ACP prepared than female teachers. This finding is inconsistent with Humphrey et al. (2008) who analyzed data from seven U.S. regions and found no gender differences between ACP and TPP completion. It is somewhat consistent with Redding and Smith (2016) who found no gender differences during earlier SASS survey years (1999–2000) and significant gender differences in later years (2011–2012); male teachers were more likely to be ACP prepared than female teachers in the later SASS survey.

The Pell-grant eligibility explanation used above for differences across ethnicity does not apply to gender because Van Overschelde and Burgard (2019) found that male and female teacher candidates were equally likely to be Pell-eligible. Future research will be needed to understand why this pattern exists.

### **Teacher Attrition**

In answer to our research question about difference in new teacher attrition, we found that TPP teachers were 66% less likely to leave the classroom across the decade examined. This difference in attrition from the classroom exists despite our accounting for the significant demographic differences between the TPP- and ACP-prepared teachers. This finding is consistent with a large body of research (e.g., Boyd et al., 2012; Redding & Smith, 2016; Van Overschelde et al., 2017).

After accounting for difference in the type of teacher preparation (TPP vs ACP), we also found that Latinx and Black teachers were more likely to remain in the classroom than were White teachers. Other-ethnicity teachers were more likely to leave the classroom than were White teachers. These findings are consistent with the 34-study meta-analysis conducted by Borman and Dowling (2008) who found White teachers more likely to leave teaching than teachers of color during the first 5 years. Our result is also inconsistent with a more recent study (Raue et al., 2015) that used a small

sample of national survey data; this study found that teachers of color were slightly more likely to leave teaching compared to White teachers. It is also inconsistent with Redding and Smith (2016) who used SASS survey data from mostly TPP teachers and found no differences in teacher attrition across ethnicity. Some of the differences in findings can be attributed to (a) when attrition differences were assessed (i.e., after 5 years or grouping all teachers with five or fewer years of experience tracking versus our tracking employment each year) and (b) grouping all teachers of color into a single group versus our disaggregating results by ethnicity.

We also found that Latinx teachers who were TPP prepared stayed teaching the longest of all the groups examined. This is a new finding because we found no new teacher attrition study that disaggregated teachers by race/ethnicity group and by teacher preparation pathway.

Collectively, these findings are important for three reasons. First, the results reveal that after accounting for these important and significant demographic differences in teacher preparation pathway selection, TPP teachers are still significantly more likely to remain teaching compared to ACP teachers. This finding has important policy and financial implications. If states move to increase ACP teacher preparation through legislative and policy changes, then they are exacerbating the new teacher “revolving door” that exists because the ACP teachers are much more likely to leave teaching than TPP teachers. States that increase ACP production are also increasing the overall cost of public education because it costs school districts more money to replace the large number of ACP teachers who leave. We estimated that Texas school districts alone would have saved \$144 million during the timeframe of our study by hiring only TPP teachers, if TPPs had produced enough teachers to meet the demand (Alliance for Excellent Education, 2014). This finding also implies that people who enroll in ACPs for their teacher preparation are spending money, and potentially accruing financial aid debt, to be trained for a profession they will likely leave in the first few years. In addition, when considering hiring and retaining a diverse teaching body, states should consider the high likelihood that teachers who are prepared through ACPs will leave teaching after only a few years.

However, simply decreasing ACP new teacher production at this time, without concomitant policy changes that substantially increase TPP production, would likely be catastrophic for school districts because districts are facing large losses in experienced teachers to retirement and to professional advancement. Instead, states must reduce the unnecessary and counterproductive barriers for people wanting to enter the teaching profession. For example, the GPA criterion for undergraduate students seeking TPP admissions is one such unnecessary and counterproductive barrier. Van Overschelde and López (2019) showed that increasing the sophomore GPA criterion for TPP admission dramatically and significantly reduced the number of future teachers and is biased against male teachers and Black teachers. Van Overschelde and López (2019) also showed that increasing the GPA admission criterion had almost no impact on the quality of teachers prepared. Therefore, the push by states and national accrediting bodies to increase undergraduate GPA admission criteria for TPPs exacerbates the teacher shortage and reduces the gender and ethnic diversity of U.S. teaching force. This loss of teachers in general, and of male and Black teachers in particular, will likely hurt the students these policies are purported to help.

Second, after accounting for these differences in who selects ACP versus TPP programs, we found that Black and Latinx teachers stayed teaching significantly longer than White teachers, and White teachers stayed teaching significantly longer than Other-ethnicity teachers. This pattern clarifies and extends the extant literature on teacher persistence, but it also begs the question about why differences in attrition exist across ethnicity groups.

The finding that Black teachers stay teaching significantly longer than White teachers is counter-intuitive given a recent study by Van Overschelde and Piatt (2019). Van Overschelde and Piatt found that Black teachers were significantly more likely to be assigned to teach classes out of their field of preparation, and several prior studies have found that out-of-field teaching assignments increase teacher attrition (e.g., Donaldson & Johnson, 2010; Sharplin, 2014). Therefore, all else being equal,

Black teachers should be more likely to leave the classroom than White teachers. Future research will be necessary to explore this issue in more detail.

Third, our results show that TPP-prepared Latinx teachers are the most likely of all teachers to stay teaching; they were 12% more likely to remain in the classroom than their peers. Therefore, university TPPs should increase efforts to recruit Latinx students into teaching. Given the increasing Latinx student populations in U.S. schools, increasing the numbers of Latinx teachers could simultaneously reduce school districts' long-term hiring costs and likely improve student academic performance nationwide. Van Overschelde and Garza (2019) showed that Latinx teacher candidates were more motivated to be agents of social change and help disadvantaged children than White teacher candidates. Therefore, Van Overschelde and Garza (2019) suggested several ways that TPPs can market their programs to Latinx students to increase teacher diversity by emphasizing

*the opportunities teachers have to be agents of social change by enhancing social equity and cultural relevance, positively shaping the future for children, and making an important contribution to society* (p. 25).

Research has also shown that increasing the racial match of teachers and students, while not a guarantee of student success, results in higher academic performance for students of color (Clotfelter, Ladd, & Vigdor, 2005; Dee, 2005; Egalite, Kisida, & Winters, 2015; Goldhaber & Hansen, 2013), and no significant difference for White students who have teachers of color (Goldhaber & Hansen, 2013).

Alternative certification programs were established to address the teacher shortage by increasing the quantity and diversity of teachers in U.S. schools (U.S. Department of Education, 2002; Woods, 2016). The present results indicate that ACPs have been largely successful in this regard, but only in the short run because the teachers they prepare are substantially and significantly less likely to remain teaching.

## Limitations

Our research is limited by the fact that the data were from a single state, albeit the second largest state in the USA with a student population that increased between the 2000 and 2010 US Censuses by more than any other state and a majority of that growth was with students of color. Our research is also limited by the fact that Texas produced the vast majority of non-university ACP teachers in the USA. Therefore, the results might not reflect teacher attrition in states where a small fraction of the teachers are ACP prepared.

Although we found that ACP teachers were significantly more likely to leave the classroom than TPP teachers, all else being equal, it is entirely possible that ACP teachers systematically went into different types of schools or had different types of employment responsibilities than TPP teachers. For example, Van Overschelde and Piatt (2019) found that the second strongest predictor of teachers being assigned to teach classes out-of-field is that they were alternatively prepared. Given research that shows teachers teaching out-of-field experience more stress and shorter persistence in the field (see Van Overschelde & Piatt, 2019 for summary), the current findings about ACP persistence may reflect this systematic difference in both employment environment quality and principal effectiveness.

Finally, we intentionally excluded teachers who completed post-baccalaureate (PB) preparation programs because the vast majority of policies in Texas have focused on TPP and ACP teachers, almost all new teachers were prepared through TPP and ACP routes (94.5%), and because of the very small number of PB teachers of color. We acknowledge that had we included this group of teachers our results may have changed.

## Conclusion

Our research shows that people of different demographic characteristics select traditional teacher preparation programs versus alternative certification programs. Black, Latinx, and Other ethnicity teachers as well as male teachers are prepared more often by ACPs, compared to their White and

female peers, respectively. Traditional university-based TPPs need to determine which aspects of their programs are either not appealing or impediments to student of color, particular Black and male students. Future research is needed to determine why teachers of color and male teachers are much more likely to prefer ACPs over TPPs. We suspect that the unpaid student-teaching experience required by TPPs (because of state policies) is largely to blame for this pattern. Van Overschelde and Burgard (2019) found that teacher candidates of color at one large TPP were, on average, from lower-income families than were White students. TPPs that have a social-justice focus or are actively working to recruit students who reflect the demographic characteristics of the students they will teach can change their program's design to, for example, a 4 + 1 program where a paid student-teaching experience occurs in the year following the awarding of the bachelor's degree.

Our present results also indicated that ACP teachers were significantly more likely to leave the classroom than TPP teachers, even after accounting for these demographic differences. States that are pushing or considering pushing to increase the number of ACPs should be leery of doing so because these moves are likely to exacerbate the new-teacher revolving door – the loss of new teachers within the first few years of teaching.

Our present results also showed that Black and Latinx are significantly more likely to remain teaching compared to White teachers, after accounting for differences in preparation pathway and age, and Latinx teachers who were prepared by TPPs stayed teaching the longest of all the groups examined. These findings further suggest that TPPs need to increase the diversity of the teacher candidates they prepare. Preparing more teachers of color will reduce the overall teacher attrition rates and reduce the costs to taxpayers of hiring new teachers.

Taken together, these findings have important policy and research implications. If we want US public school classrooms in 2025 to be staffed by high-quality diverse teachers who remain teaching, then changes to educator preparation accountability and accreditation policies are needed at the state and national levels. For example, these policies need to reduce the barriers students face when applying for TPP admission and allow more flexibility in the ways teachers are prepared – while using research-based measures to simultaneously hold programs accountable for preparing high-quality teachers. If ACP- and TPP-prepared teachers are being employed by qualitatively similar kinds of schools, but ACP teachers are leaving the classroom at substantially and significantly higher rates than TPP teachers, then increasing teacher preparation by encouraging the proliferation of ACPs is an expensive and counter-productive solution to the teacher shortage issue in the USA. Future research is needed to determine the characteristics and quality of the educational environments in which White versus teachers of color teach.

## Note

1. Quantity based on authors' calculations of 2016 Title II data available at <https://title2.ed.gov/Public/DataTools/NewExcels/CompletersProgramType.aspx> (accessed 3/22/2018).

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